PB85-173094

Exhaust and Evaporative Emissions of High Mileage Passenger Cars

(U.S.) Environmental Protection Agency
Ann Arbor, MI

Feb 85

U.S. Department of Commerce
National Technical Information Service
NTIS

PB85-173094

EPA-AA-TSS-PA-85-1

Technical Report

Exhaust and Evaporative Emissions of High Mileage Passenger Cars

Project Officer:
Craig A. Harvey

Branch Technical Representative:
Bruce Michael

February 1985

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Technical Reports do not necessarily represent final EPA decisions or positions. They are intended to present technical analysis of issues using data which are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments which may form the basis for a final EPA decision, position or regulatory action.

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Office of Mobile Sources
Office of Air and Radiation
U. S. Environmental Protection Agency

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NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA-AA-TSS-PA-85-1		PB85 173094/AS

4. TITLE AND SUBTITLE	5. REPORT DATE
Exhaust and Evaporative Emissions of High Mileage Passenger Cars	February 1985
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
Craig A. Harvey and Bruce Michael	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
U.S. Environmental Protection Agency Office of Mobile Sources Technical Support Staff Ann Arbor, MI 48105	11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED Technical
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report gives the results of exhaust and evaporative emission tests Southwest Research Institute performed on 27 motor vehicles. Test cars were selected randomly from a registration list of all 1981 passenger cars in Bexar County, Texas (which includes the greater San Antonio area and some surrounding suburban and rural areas). Seven of the 27 cars underwent restorative maintenance after baseline testing (replaced canister or gas cap) and evaporative emissions were measured again after maintenance.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Quality Exhaust Emissions Motor Vehicles Inspection Maintenance Tests	Evaporative Emissions Inspection/Maintenance	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release Unlimited	unclassified	26
	20. SECURITY CLASS *(This page)*	22. PRICE
	unclassified	

EPA Form 2220-1 (9-73)

PREFACE

This report gives the results of exhaust and evaporative emissions tests Southwest Research Institute performed on 27 vehicles. Test cars were selected randomly from a registration list of all 1981 passenger cars in Bexar County, Texas (which includes the greater San Antonio area and some surrounding suburban and rural areas). Seven of the 27 cars underwent restorative maintenance after baseline testing (replaced canister or gas cap) and evaporative emissions were measured again after maintenance.

The Southwest Research Institute report was originally submitted to EPA with three appendices attached. The first, "Appendix A: Project Set-Up and Car Selection," has been retained. The second, "Appendix B: Data and Coding Sheets," and the third, "Appendix C: Computer Printouts of the Emissions Results" have been omitted. However, the vehicle emissions results contained in Appendices B and C have been added to EPA's Emission Factor Program (MICRO files) as part of a larger in-use vehicle emissions test data base. The results of these emissions tests are summarized in Tables 6 and 7 of this report.

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September 28, 1984

TO: Mr. Craig A. Harvey, Project Officer
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SUBJECT: Summary of Work Conducted for the period May 30 through September 28, 1984; Work Assignment No. 20, Contract 68-03-3162, "Testing of High Mileage Taxicabs and Passenger Cars," SwRI Project No. 03-7338-020.

I. INTRODUCTION

The objective of this Work Assignment, as conducted, has been to accumulate regulated emissions data on randomly selected, privately owned 1981 passenger cars. The scope of this effort was to test as many cars as possible within the time and funding allocated to this Work Assignment.

The original objective of this Work Assignment was to accumulate emissions data on several high mileage taxicabs and privately owned passenger cars. At the direction of the Project Officer on July 9, the objective was changed to testing randomly selected, privately owned 1981 passenger cars; this change in technical direction was defined in the letter from the undersigned to the EPA Project Officer dated July 16, 1984. Work conducted in accord with the original objective of this Assignment was reported in Monthly Progress Report No. 1, dated July 15, 1984; and that initial effort is included in this summary by reference to that progress report, a copy of which is in Appendix A-1 of this summary report.

II. CAR SELECTION

Test cars were selected randomly from a registration list of all 1981 passenger cars in Bexar County, Texas (which includes the greater San Antonio area and some surrounding rural and suburban areas) to fill a test matrix provided by the Project Officer. The test car matrix, given in Table 1, included 35 cars of various make and engine size. Due to the time constraints in this Work Assignment, with the likelihood of not having time to test 35 cars, the test matrix was initially reduced to ten cars as shown in Table 2. The matrix was subsequently increased to 21 cars and then to the 27 cars actually tested. The test matrices for 21 and 27 cars are shown in Tables 3 and 4, respectively.

TABLE 1. THIRTY-FIVE (35) CAR TEST MATRIX FOR 1981 PASSENGER CARS

Make/Engine	4 cyl.	6 cyl.	8 cyl.
GMC	5 vehicles code: [a]9, G, 5	6 vehicles code: X, Z, K, 3 A, 4	3 vehicles code: [a]S, F, J, T, W, H, Y, L, 6
Ford	6 vehicles code: 2, A	3 vehicles code: B	1 vehicle code: D, F, G
Chrysler	3 vehicles code: A, C, D	--	--
Datsun	1 vehicle code: all	--	--
Toyota	3 vehicles code: all	--	--
Honda	2 vehicles code: all	--	--
Subaru	1 vehicle code: all	--	--

[a]VIN code "9" for GM designates a 4-cylinder engine in most cases, except for Cadillac. For GM Cadillac, "9" designates a V-8 engine.

TABLE 2. TEN (10) CAR TEST MATRIX FOR 1981 PASSENGER CARS

Make/Engine	4 cyl.	6 cyl.	8 cyl.
GMC	2 vehicles code: [a]9, G, 5	2 vehicles code: X, Z, K, 3 A, 4	1 vehicle code: [a]S, F, J, T, W, H, Y, L, 6
Ford	2 vehicles code: 2, A	1 vehicle code: B	0 vehicle code: D, F, G
Chrysler	1 vehicle code: A, C, D	--	--
Datsun	0 vehicle code: all	--	--
Toyota	1 vehicle code: all	--	--
Honda	0 vehicle code: all	--	--
Subaru	0 vehicle code: all	--	--

Figure 2. Ten (10) Car Test Matrix for 1981 Passenger Cars

[a]VIN code "9" for GM designates a 4-cylinder engine in most cases, except for Cadillac. For GM Cadillac, "9" designates a V-8 engine.

TABLE 3. TWENTY-ONE (21) CAR TEST MATRIX FOR 1981 PASSENGER CARS

Make/Engine	4-cylinder	6-cylinder	8-cylinder
GMC	4 vehicles code: [a]9, G, 5	4 vehicles code: X, Z, K, 3 A, 4	2 vehicles code: [a]S, F, J, T, W, H, Y, L, 6
Ford	4 vehicles code: 2, A	2 vehicles code: B	0 vehicle code: D, F, G
Chrysler	2 vehicles code: A, C, D	--	--
Datsun	0 vehicle code: all	--	--
Toyota	2 vehicles code: all	--	--
Honda	1 vehicle code: all	--	--
Subaru	0 vehicle code: all	--	--

[a]VIN code "9" for GM designates a 4-cylinder engine in most cases, except for Cadillac. For GM Cadillac, "9" designates a V-8 engine.

TABLE 4. TWENTY-SEVEN (27) CAR TEST MATRIX FOR 1981 PASSENGER CARS

Make/Engine	4-cylinder	6-cylinder	8-cylinder
GMC	5 vehicles code: [a]9, G, 5	5 vehicles code: X, Z, K, 3 A, 4	2 vehicles code: [a]S, F, J, T, W, H, Y, L, 6
Ford	6 vehicles code: 2, A	2 vehicles code: B	1 vehicle code: D, F, G
Chrysler	3 vehicles code: A, C, D	—	—
Datsun	0 vehicle code: all	—	—
Toyota	2 vehicles code: all	—	—
Honda	1 vehicle code: all	—	—
Subaru	0 vehicle code: all	—	—

[a]VIN code "9" for GM designates a 4-cylinder engine in most cases, except for Cadillac. For GM Cadillac, "9" designates a V-8 engine.

The registration list of 42,000 1981 passenger cars in Bexar County, Texas was obtained on magnetic tape, sorted by make and VIN. This list was broken into smaller files by make and number of engine cylinders. Using a standard statistical computer program, The Statistical Package for the Social Sciences (SPSS), a set percentage of a smaller file was selected randomly and printed (usually about 200 registrations from each of the smaller files). Using a random number table, these lists were recompiled to establish random priority for specific vehicle selection.

Randomized lists for GM cars were obtained and preparations were completed to mail out letters soliciting the randomly-picked test cars. Prior to mailing, however, it was noted that no Cadillacs were in the listing for GM 8-cylinder cars, but many Cadillacs were noted in the GM 4-cylinder list. The VIN codes were reviewed and found to be in error. The "9" for the eighth digit on most GM cars designates a 4-cylinder engine, but for Cadillac, a "9" designates an 8-cylinder engine. All letters were withdrawn, all codes were checked, and new GM lists were generated.

Telephone contact was made with the persons to whom letters were sent. Of those contacted, most were interested in participating. A set of the forms developed to solicit and obtain test cars from the public is given in Appendix A-2.

III. TEST AND INSPECTION PROCEDURES

The emission testing and car inspections were conducted in accord with entries on the computer coding sheets provided by the EPA Branch Technical Representative, copies of which are included in Appendix B. The Branch Technical Representative deleted the requirements for a propane gain check and measurement of NO_x in the steady-state tests involving undiluted exhaust.

As defined by the Branch Technical Representative, the checks of the emission control components on the engine primarily consisted of a relatively thorough visual check. In general, only the EGR and evaporative emissions systems received any functional checking. All decisions concerning restorative maintenance were made by the Branch Technical Representative. The criteria for consideration of restorative maintenance and retesting were as follows:

1. Total evaporative HC greater than 5.0 grams
2. Disabled or tampered emission components
3. FTP exhaust HC greater than 1.5 gm/mile
4. FTP exhaust CO greater than 50 gm/mile
5. FTP exhaust NO_x greater than 2.5 gm/mile

The above conditions are listed in order of their maintenance importance. Generally, only one type of maintenance was performed, to correct one problem. However, no exact guidelines were given for maintenance, and so the EPA Branch Technical Representative had to be contacted. In general, restorative maintenance was conducted only when the evaporative emissions exceeded five grams per test.

The CVS-diluted exhaust emission tests and the evaporative emissions tests were conducted in accord with appropriate sections of the Code of Federal Regulations. The I-M short tests were conducted in accord with instructions provided by the EPA, as summarized in the I-M Short Test data sheets included in Appendix B-1. Hydrocarbons and carbon monoxide were measured using a Beckman Model 590 HC/CO infrared vehicle exhaust analyzer (garage-type analyzer). Carbon dioxide was measured using a Beckman Model 315B infrared analyzer, and oxygen was measured using a Beckman Model OM-11EA. As backups, HC and CO were also analyzed using Beckman Model 315B infrared analyzers.

Each car tested went through the specific series of inspections and evaluations. The record sheet and the test sequence used are given in Appendix B-2.

The data obtained were processed as necessary to enable making a decision on restorative maintenance and filling out the computer coding sheets provided by the Branch Technical Representative. Copies of the coding sheets are included in Appendix B-3.

IV. TEST RESULTS

A summary of all cars tested and the tests conducted is given in Table 5. The computer printouts of the results of FTP, HFET, and bagged idle emissions tests are given in Appendix C. These results are summarized, along with the results of the evaporative emissions tests, in Tables 6 and 7. The fuel economy results are summarized in Table 8. All other items of information and test results are reported on the computer coding sheets, which have been provided to EPA in shipments separate from this summary report. Data provided for each car tested are as follows:

- Computer Coding Sheets
- Computer Printouts of the Emissions Test Results, Evaporative Emission Calculations, Restorative Maintenance, I-M Short Test Data Sheets, and Original Chart of the I-M Short Tests

IV. SUMMARY AND COMMENTS

A total of 27 cars were evaluated under this Work Assignment, seven of which also underwent restorative maintenance. The data were recorded on computer coding sheets, and a separate packet of data for each car was provided to the Branch Technical Representative.

This Work Assignment required considerable initial effort for technical redirection, car selection, and setting up for the test effort, and the extensive data reporting requirements. After processing several cars through the laboratory, operations were streamlined and the effort per car decreased.

TABLE 5. VEHICLES TESTED AND TESTS CONDUCTED
UNDER WORK ASSIGNMENT NO. 20

Test Car Number	Make	Model	Number of Cylinders	Emission Test No.	S.H.E.D. Test No.	Comments
01	GMC	Phoenix	4	01-1	01-1	
02	Ford	Zephyr	6	02-1	02-1 & -6	new gas cap
03	Toyota	Corolla	4	03-1	03-1	
04	GMC	Firebird	6	04-1	04-1	
05	GMC	Cutlass	8	05-1	05-1 & -6	new canister
06	GMC	Century	6	06-1	06-1	
07	Ford	Futura	4	07-1	07-1 & -6	new canister
08	Chrysler	Reliant	4	08-1	08-1	
09	Ford	Mustang	4	09-1	09-1	
10	GMC	Skylark	4	10-1	10-1	
11	Ford	Cougar	6	11-1	11-1	
12	GMC	Chevette	4	12-1	12-1 & -6	new canister
13	GMC	Omega	4	13-1	13-1 & -6	new canister
14	GMC	Monte Carlo	6	14-1	14-1	
15	Ford	Escort	4	15-1	15-1	
16	Ford	Zephyr	4	16-1	16-1	
17	GMC	Skylark	6	17-1	17-1	
18	Chrysler	Reliant	4	18-1	18-1	
19	Toyota	Corolla	4	19-1	19-1	
20	Honda	Accord	4	20-1	20-1	
21	GMC	Chevette	4	21-1	21-1 & -6	new canister
22	Ford	Zephyr	4	22-1	22-1	
23	GMC	Cutlass	6	23-1	23-1	
24	GMC	Delta 88	8	24-1	24-1 & -6	new canister
25	Ford	Capri	4	25-1	25-1	
26	Ford	Marquis	8	26-1	26-1	
27	Chrysler	Reliant	4	27-1	27-1	

TABLE 6. SUMMARY OF THE FTP AND EVAPORATIVE EMISSIONS TEST RESULTS

Test No.	Car Make	Car Model	FTP Emissions, g/mi HC	CO	NO_x	Evaporative HC, grams DBL	HSL	Total
Emissions Standards			0.41	3.4	1.0	---	---	2.0
Restorative Maintenance			1.5	50	2.5	---	---	5.0
01-1	GMC	Phoenix	0.74	8.4	1.04	1.6	2.2	3.8
02-1	Ford	Zephyr	3.42	41.0	2.93	10.9	8.6	19.5
02-6[a]	Ford	Zephyr	---	---	---	3.9	8.5	12.4
03-1	Toyota	Corolla	2.41	54.1	1.28	0.6	0.7	1.3
04-1	GMC	Firebird	2.93	33.2	1.17	2.8	0.9	3.7
05-1	GMC	Cutlass	2.15	15.3	0.80	3.1	3.3	6.4
05-6[b]	GMC	Cutlass	---	---	---	0.4	2.5	2.9[b]
06-1	GMC	Century	0.67	11.7	0.72	2.1	0.7	2.8
07-1	Ford	Futura	1.53	30.0	0.83	6.0	3.8	9.8
07-6[b]	Ford	Futura	---	---	---	2.7	2.5	5.2[b]
08-1	Chrysler	Reliant	0.32	10.2	0.82	0.6	1.0	1.6
09-1	Ford	Mustang	0.60	6.0	0.53	0.7	1.0	1.7
10-1	GMC	Skylark	1.08	10.6	1.03	2.7	1.2	3.9
11-1	Ford	Cougar	0.60	8.2	0.69	4.0	0.8	4.8
12-1	GMC	Chevette	0.41	5.3	1.36	5.1	4.5	9.6
12-6[b]	GMC	Chevette	---	---	---	3.6	1.3	4.9[b]
13-1	GMC	Omega	0.78	3.3	1.03	3.6	2.8	6.4
13-6[b]	GMC	Omega	---	---	---	0.5	1.6	2.1[b]
14-1	GMC	Monte Carlo	0.33	4.9	1.55	1.6	0.6	2.2
15-1	Ford	Escort	0.94	12.4	0.34	0.3	0.7	1.0
16-1	Ford	Zephyr	0.35	8.3	0.78	1.0	1.0	2.0
17-1	GMC	Skylark	0.31	1.5	1.10	0.4	1.8	2.2
18-1	Chrysler	Reliant	0.35	10.9	0.72	1.9	1.2	2.9
19-1	Toyota	Corolla	0.29	4.8	0.72	1.8	0.7	2.5
20-1	Honda	Accord	0.51	5.4	0.52	0.2	0.5	0.7
21-1	GMC	Chevette	0.74	7.4	0.68	0.6	5.1	5.7
21-6[b]	GMC	Chevette	---	---	---	0.3	2.6	2.9[b]
22-1	Ford	Zephyr	0.85	7.7	1.05	0.3	0.6	0.9
23-1	GMC	Cutlass	0.33	6.0	1.09	0.7	0.7	1.4
24-1	GMC	Delta 88	0.60	4.0	1.26	1.3	4.0	5.3
24-6[b]	GMC	Delta 88	---	---	---	1.8	4.0	5.8[b]
25-1	Ford	Capri	0.55	6.3	0.99	0.6	0.8	1.4
26-1	Ford	Marquis	5.92	107.7	1.25	1.6	1.9	3.5
27-1	Chrysler	Reliant	0.20	6.1	2.96	0.5	0.8	1.3

[a] Replaced faulty gas cap
[b] Replaced saturated canister

TABLE 7. MEANS OF THE FTP AND EVAPORATIVE EMISSIONS TESTS

	FTP Emissions, g/mi			Evaporative HC, grams		
	HC	CO	NOx	DBL	HSL	Total
All vehicles -- as received*	1.11	15.95	1.08	2.1	1.9	4.0
Seven vehicles -- before restorative maintenance	1.38	15.19	1.27	4.4	4.6	9.0
Seven vehicles -- after restorative maintenance**	---	---	---	1.9	3.3	5.2

* All 27 vehicles are carbureted 1981 passenger cars (no fuel injected vehicles) on which exhaust and evaporative emissions tests were run as received.

** Only evaporative emissions were measured after restorative maintenance was performed on the seven vehicles that required maintenance.

TABLE 8. SUMMARY OF FUEL ECONOMY RESULTS

Test No.	Car No.	Engine CID	Fuel Economy, mph			
			Test Results		Gas Mileage Guide	
			FTP	HFET	City	Highway
01	GM4-1	151	22	32	22	35
02	FD6-1	200	19	26	20	26
03	TO4-1	110	23	35	28	40
04	GM6-1	231	19	27	19	30
05	GM8-1	260	17	25	19	26
06	GM6-2	231	19	28	21	--
07	FD4-1	140	17	25	22	--
08	CR4-1	156	22	29	23	32
09	FD4-2	140	22	35	23	34
10	GM4-2	151	21	29	22	32
11	FD6-2	200	18	25	18	--
12	GM4-3	98	25	31	26	28
13	GM4-4	151	21	32	23	32
14	GM6-3	229	20	31	19	26
15	FD4-3	98	25	40	28	44
16	FD4-4	140	20	30	22	--
17	GM6-4	173	20	31	21	31
18	CR4-2	156	19	33	23	32
19	TO4-2	89	31	43	36	47
20	HO4-1	107	24	36	27	35
21	GM4-5	98	26	38	30	--
22	FD4-5	140	21	33	23	--
23	GM6-5	231	21	31	21	30
24	GM8-2	260	17	25	17	24
25	FD4-6	140	20	28	22	--
26	FD8-1	302	14	22	16	24
27	CR4-3	156	23	29	23	32

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Approved:

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APPENDIX A

PROJECT SET-UP AND CAR SELECTION

A-1 INITIAL PROJECT EFFORT TOWARD OBTAINING HIGH MILEAGE VEHICLES

A-2 FORMS USED TO SOLICIT AND OBTAIN TEST CARS

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July 15, 1984

TO: Mr. Robert J. Garbe, Project Officer
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FROM: Terry L. Ullman, and Charles T. Hare
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SUBJECT: Monthly Progress Report No. 1 for the period May 30 through June 30, 1984; Work Assignment No. 20, Contract 68-03-3162, "Testing of High Mileage Taxicabs and Passenger Cars", SwRI Project No. 03-7338-020.

I. INTRODUCTION

The objective of this Work Assignment was to accumulate emissions data on several high mileage taxicabs and privately owned passenger cars. At the direction of the Project Officer, the program objective has been redefined to accumulate regulated emissions data on randomly selected privately owned 1981 passenger cars.

II. PROGRESS DURING THE PERIOD MAY 30, 1984 THROUGH JUNE 30, 1984

During this reporting period, efforts to obtain high mileage passenger cars and taxicabs were begun. A "survey" letter, given as Attachment A, was circulated to the 2000+ staff of Southwest Research Institute and the Southwest Foundation for Biomedical Research. From this survey, only six positive respondents were obtained. Additional efforts were made to obtain high mileage cars from leasing organizations, public utilities, state and city properties, as well as courier services. These additional contacts resulted in potentially obtaining one more car. Table 1 lists these prospective test cars. Due to the

TABLE 1. HIGH MILEAGE CARS AVAILABLE FOR TESTING

No	Model Year	Make	Model	Mileage
1	1981	Ford	Fairmont	>75K
2	1981	Mazda	GLC	81K
3	1981	Datsun	210	113K
4	1981	Chevrolet	Impala	82K
5	1981	Mercury	Marquis	95K
6	1981	Buick	LaSabre	89K
7	1981	Mercury	Zephyr	93K

rather limited selection, auto auctions and small used car dealerships were contacted, but with no success.

Sixteen taxicab companies (all those listed in the 1984 Yellow Pages for San Antonio) were contacted concerning temporary use of their cabs for test purposes. All but two of the companies are independent (meaning "small"), and although many agreed to allow us to use their cabs, the use would have to be scheduled with the assigned driver's absence and the fee would be close to $100/day. Table 2 lists the high mileage taxicabs potentially available from independent cab owners.

TABLE 2. HIGH MILEAGE TAXICABS AVAILABLE FOR TESTING

No.	Model Year	Make	Model	Mileage
1	1981	Ford	LTD	100K+
2	1982	Dodge	Ex. Police	100K+
3	1982	Mercury	Zephyr	100K+
4	1981	Chevrolet	Malibu	100K+
5	1981	Plymouth	Grand Fury	100K+
6	1981	Plymouth	Grand Fury	100K+
7	1982	Ford	LTD	100K+

The other two cab companies (Yellow and Checker Cab Co.) were owned by the same individual. Since these companies are larger, they have greater driver turnover and more cars available. Obtaining the cabs for testing would be easier and would cost about $66/day. Between these two major cab companies, all the cars meeting the model year and mileage criteria were 1982 Dodge Diplomats, numbering about 20.

In order to start testing, plans were initiated to obtain and begin testing of one of the passenger cars for 2 July 1984. Based on the limited success of finding candidate high mileage passenger cars or taxicabs, Bruce Michael was concerned and the scheduled tests were put on hold June 29th. On July 9, 1984, Mr. Michael redefined the objective of the program, such that only 1981 passenger cars would be tested. These test cars would be randomly selected from a registration list of all 1981 passenger cars from Bexar County, Texas (which includes the greater San Antonio area and some surrounding rural and suburban areas). Cars would be randomly selected from the list in order to fill a test matrix to be supplied by the Project Officer. This matrix would be similar to that used in an earlier EPA program conducted by EPA, Ann Arbor.

III. PLANS FOR THE NEXT REPORTING PERIOD

Plans to obtain the necessary registration list are underway and the list is expected by July 19, 1984. We hope to acquire the first test car by July 25, 1984.

Submitted by:

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Director
Department of Emissions Research

SOUTHWEST RESEARCH INSTITUTE

INTER-DEPARTMENTAL MEMORANDUM

TO: SwRI and SFBR Staff

FROM: Terry Ullman - Dept of Emissions Research

SUBJECT: Exhaust Emissions and Fuel Economy Tests on Employee-owned Cars

DATE: June 12, 1984

Do you own a 1981 model car that has been driven over 75,000 miles, using only unleaded gasoline? If so, would you be willing to allow it to be used in an exhaust emission survey to be conducted at the Department of Emissions Research starting in July 1984? The test will require approximately five (5) days.

If your car is selected and used, you will be given $75.00 for the use of your car and will be furnished a car for transportation. Based on results from initial inspection and emissions tests, your car may qualify for restorative maintenance at no cost to you. Upon completion of testing, your car will be returned to you with a full tank of gasoline and, if desired, its emissions and fuel economy (mpg) test results.

If you are willing to participate, please fill in the form and return it to Terry Ullman at Building 87. If you have any questions, contact Terry Ullman at extension 2654.

- -

Yes, I would like to participate in the exhaust emissions survey to be conducted at the Department of Emissions Research.

My car has _____ actual miles on the odometer and, to the best of my knowledge, only unleaded fuel has been used.

Year_____ Make_____ Model _____

Name _____ Dept. _____ Telephone Ext._____

SOUTHWEST RESEARCH INSTITUTE

POST OFFICE DRAWER 28510 · 6220 CULEBRA ROAD · SAN ANTONIO, TEXAS 78284 · (512) 684-5111

1984

Name
Address
City, State Zip

Your 1981 Mercury, VIN 1MEBP72A1BK639546, License No. ZKT365, car is one of a very few (about 30 in Bexar County) selected for a special test program sponsored by the U.S. Environmental Protection Agency (EPA). This program consists of performing tests on automobiles to measure their exhaust emissions and is being conducted by the Department of Emissions Research, Southwest Research Institute.

If you agree to have your car tested, you will receive $75.00 and free use of a current model rental car while yours is being tested for three or four days. Based on results from initial inspection and emissions tests, your car may qualify for restorative maintenance at no cost to you. Upon completion of testing, your car will be returned to you with a full tank of gas.

You will be contacted by telephone in the next few days to determine your interest in volunteering for this special project. The engineer calling will explain how the program works and will be glad to discuss any questions you may have concerning the program or scheduling.

Sincerely,

Terry L. Ullman
Program Manager
Southwest Research Institute
Department of Emissions Research

TLU/sat

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CONTROL NO. _ _____
Data Form No. 7338.1

TEST AGREEMENT

Your vehicle is being loaned to Southwest Research Institute (hereinafter referred to as SwRI), for use in a government sponsored program for cleaner air. This Agreement, signed by the Director of the Department of Emissions Research, SwRI, is your assurance of full protection against any loss sustained by accident or damage to the vehicle while in the possession of SwRI, or its designated representative.

1. I, _____, agree to loan my vehicle described as a _____ (Year) _____ _____ (Make and Model), registered in the State of _____ under License Plate No. _____ to SwRI, for a period of approximately _____ days for a series of tests. I further agree that, should testing not be completed within the time period specified above, I will execute the Agreement Renewal which is an addendum to this Agreement, for the additional time required to complete testing. I understand that I may rescind this loan of the vehicle to SwRI at any time and that I am under no obligation whatsoever.

2. SwRI agrees to be fully responsible for any and all damage to the vehicle occurring while the vehicle is in their possession. Possession is hereby defined as care, control, custody, operation, inspection or storage between the time the vehicle is received from the owner by SwRI and the time the vehicle is returned to the owner.

3. SwRI agrees to indemnify and hold harmless the vehicle owner of any repairs, damage, loss of liability sustained by the vehicle owner by reason of accident or damage to the vehicle while in its possession.

4. SwRI agrees to provide primary automobile insurance on the vehicle while in its possession.

5. SwRI agrees to execute extreme care in the use of the vehicle and agrees to return the vehicle to the owner in as good exterior, interior and operating conditions, except for normal wear and tear, as when the vehicle was received by SwRI.

AGREED TO this _____ day of _____, 19 ____.

VEHICLE OWNER

By: _____

SOUTHWEST RESEARCH INSTITUTE
Department of Emissions Research

By: Karl J. Springer
Karl J. Springer, Director

SOUTHWEST RESEARCH INSTITUTE

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CONTROL NO: _____
Data Form No. 7338.2
Page 1 of 1

TEST AGREEMENT ADDENDUM

I, _____ owner ( ) and/or joint-owner ( ) and/or principal driver ( ) of the vehicle described as a (Year) _____ (Make & Model) _____, registered in the State of _____, agree to extend original testing agreement dated _____, 19 ____ for a period of _____ days.

VEHICLE OWNER

By: _____

Date: _____

SOUTHWEST RESEARCH INSTITUTE

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CONTROL NO. _____
Data Form No. 7338.3

STANDARD VEHICLE LOAN AGREEMENT

In consideration of the undersigned/Participant (hereinafter referred to as Participant) who has agreed to assist in this Environmental Protection Agency sponsored program for cleaner air, Southwest Research Institute (hereinafter referred to as SwRI), hereby loans to Participant the vehicle described below, subject to the terms and conditions of this agreement.

1. Participant agrees to exercise care in the use of the loan vehicle and agrees to return the loan vehicle within a period of time not to exceed ten working days, together with all tires, tools, and accessories, to SwRI in as good exterior, interior, and operating condition, except for normal wear and tear, as when the vehicle was received by the Participant.

2. Participant agrees that loan vehicle will not be operated to carry passengers or property for a consideration, expressed or implied, or to push or tow any vehicle or trailer. Loan vehicle will be operated only by Participant's immediate family, provided that Participant's permission be given first and that all such operators shall be at least 21 years of age and duly qualified and licensed.

3. Participant expressly acknowledges personal liability for: (a) gasoline and all charges, fines, and costs for parking, traffic, or other legal violations assessed against loan vehicle, Participant, or SwRI except where caused through fault of SwRI; (b) SwRI's costs including reasonable attorney's fees, where permitted by law, incurred collecting payments due from Participant hereunder; (c) SwRI's costs to repair collision or upset damages to loan vehicle provided. However, if loan vehicle is operated in accordance with all terms hereof, Participant's liability for such damage will not exceed $75.00.

4. Participant will not be liable for noncollision losses to loan vehicle caused by perils normally protected against by a comprehensive physical damage insurance policy.

5. Participant and any authorized operator as prescribed in paragraph above, agrees to participate as an insured in benefits of an automobile liability insurance policy, a copy of which is available from SwRI. Said policy is primary in respect to other insurance carried by Participant or authorized operator and contains bodily injury or death liability limits of $250,000 for each person in each accident and subject to the foregoing limitation; $500,000 limits for all persons in each accident and property damage liability limits of $50,000 for each accident. Participant is bound by and agrees to the terms, conditions, limitations, and restrictions of the policy; its being understood that the policy is a standard motor vehicle policy in the state that garages the vehicle.

6. Participant agrees to release SwRI from any liability for loss of or damage to any property left, stored, or transported by Participant or any other person in or upon vehicle after receipt, during term of this loan, or after return of loan vehicle to SwRI. Participant further agrees to indemnify and hold harmless SwRI against all claims arising out of such loss or damage.

7. AGREED TO this _____ day of _____, 19 ___.

PARTICIPANT

By: _____
Driver's License # _____
Expiration Date: _____

Southwest Research Institute
Deparmtent of Emissions Research

By: Karl J. Springer
Karl J. Springer, Director

Condition of Loan Car (Lic. No. _____)

OUT			IN		
OK	Initial	Date	OK	Initial	Date

CONTROL NO.
Data Form No. 7338.4

PRELIMINARY VEHICLE INSPECTION REPORT

Date _____

Vehicle Owner _____

Control Number _____, License No. _____

Year, Make & Model _____

Odometer _____, Locking Gas Cap _____ Emission Label _____

Exterior Damage:
- Left Front _____
- Right Front _____
- Left Rear _____
- Right Rear _____
- Other _____

Interior Damage:
- Seats _____
- Head Liner _____
- Floor Carpet _____
- Radio _____
- Other _____

Condition of:
- Metal _____
- Paint _____
- Chrome _____
- Glass _____
- Tires _____
- Other _____

Contents of:
- Glove Compartment _____
- Trunk _____
- Other _____

Notes of Operation: _____

_____

_____

Document all significant problems with pictures

SwRI Representative _____ Date: _____

Car Owner or Representative _____ Date: _____

Comments: _____

_____

_____